

**SECRET**

MONTHLY REPORT



25X1

PAR 216

7 August 1964

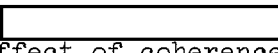
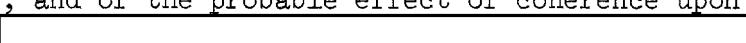
SUBJECT: Exposure of Photographic Material with Lasers

TASK/PROBLEM

1. Determine the manner and degree of the interaction of present and predictable future photographic films with coherent radiation from laser sources in red and near IR spectrum ranges.

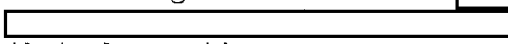
DISCUSSION

2. In the various experiments carried out on this project we can find no evidence that the photographic emulsion (acting as a receiver) behaves any differently for coherent radiation than for non-coherent light about the same wavelength.

3. Discussion of the nature of coherence with  our consultant optical physicist, and of the probable effect of coherence upon latent image formation with 

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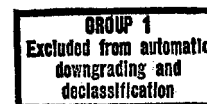
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 has provided theoretical confirmation of that observation.

4. The interference effects observed in photographic exposures to laser (or other coherent radiation) can be explained as interference occurring outside the receiving photographic emulsion.

5. It appears the most useful effort for future work is in the study of optical projection systems with laser versus tungsten filament sources and with photographic originals versus other types of object material.

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Declass Review by NIMA/DOD

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25X1 6. During this period an investigation of reticle projection using the NeNe gas laser was begun. The .005 inch and the 0.1 millimeter scales on the [ ] measuring magnifier were used for the reticle and a single element lens was used to project this reticle on to a 4" x 5" sheet of SO-243 film. Exposures were made with the film plane at the geometrical focus as well as at several positions both ahead and behind it. Control exposures were also made using a tungsten filament source.

7. The exposures made using the laser source all displayed the characteristic interference ring patterns. In addition, exposures made at several out of focus positions displayed very strong line patterns. These patterns were a result of constructive interference created by the coherent laser beam and the regular line pattern in the reticle. This effect was not evident when the tungsten filament was used as the source.

#### PLANNED ACTIVITY

8. In the coming period we will begin preparation of a high optical quality projection system as required for quantitative evaluation of these interference characteristics. The system will be diffraction limited at about 100 lines/mm. The system will also have provisions to evaluate the effect of aperture size and shape on the image.

9. Continued effort will be directed toward finding a technique to produce a uniformly intense laser beam as required for practical use of the laser in photographic image transfer.

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